IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Examiner: Hodges, Matthew P.
Yoji Yamamoto	Group Art Unit: 2879
Serial No.: 10/755,528	
Filed: January 12, 2004	
For: CATHODE STRUCTURE INCLUDING BARRIER FOR PREVENTING METAL BRIDGING FROM HEATER TO EMITTER	July 3, 2007 Costa Mesa, California 92626

RESPONSE TO OFFICE ACTION

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sirs:

In response to the Office Action of April 6, 2007, applicant requests that the following be entered:

IN THE CLAIMS:

1. (Currently Amended) A cathode structure comprising:

a heater including a columnar electric insulating material body and a heating wire that is partially buried and in contact with the electric insulating material body, wherein the heating wire is coiled, within the insulating material body, around a first axis; and

a cathode unit is disposed at a first end surface of the electric insulating material body including a metal cup and a pellet member supported in the metal cup, the pellet member containing an electron-emitting material, wherein

the heating wire leads out from a second end surface of the electric insulating material body and the first axis of the coiled heating wire is parallel to the first end surface of the electric insulating material to provide a compact configuration for the cathode structure with an enlarged heat transmitting capacity.

2. (Original) A cathode structure according to Claim 1, wherein

the electric insulating material body includes a wall disposed on the second end surface so as to surround a position from which the heating wire leads out.

3. (Previously Presented) A cathode structure according to Claim 2, wherein the wall is disposed around a perimeter of the second end surface,

the second end surface surrounded by the wall rises in a dome shape, and

the heating wire leads out from a position between the wall and a center of the second end surface.

4. (Previously Presented) A cathode structure according to Claim 1, wherein the electric insulating material body is in a circular columnar shape, and includes a part that has a greater diameter than that of the second end surface.

5. (Currently Amended) A cathode structure comprising:

a heater including a columnar electric insulating material body and a heating wire that is partially buried and in contact with the electric insulating material body and leads out from a side surface thereof, wherein the heating wire is coiled, within the insulating material body, around a first axis traverse to the side surface; and

a cathode unit disposed at one of an end surface of the electric insulating material body, and emitting electrons from a surface of the cathode unit when heated by the heater, the cathode unit includes a metal cup and a pellet member containing an electron-emitting material supported in the metal cup, wherein

the electric insulating material body includes a protrusion disposed on the side surface between a position from which the heating wire leads out and the surface of the cathode unit from which electrons are emitted.

6. (Original) An electron gun including a cathode structure according to Claim 1.

7. (Original) A cathode ray tube including an electron gun according to Claim 6.

8. (Original) An electron gun including a cathode structure according to Claim 5.

9. (Original) A cathode ray tube including an electron gun according to Claim 8.

10. (Previously Presented) A cathode structure according to Claim 1 wherein the electron-emitting material contains barium oxide.

11. (Previously Presented) A cathode structure according to Claim 1 wherein the electric insulating material body is made of ceramic.

12. (Previously Presented) A cathode structure according to Claim 1 further comprising a supporting metal wire attached to the cathode structure between the metal cup and the heater.

13. (Previously Presented) A cathode structure according to Claim 12 wherein a plurality of supporting metal wires are attached to the cathode structure between the metal cup and the heater and extend outward from the side of the cathode structure.

14. (Previously Presented) A cathode structure according to Claim 13 wherein the heater wire is coiled into an S shape when viewed perpendicular to an axis through the cathode structure.

15. (Previously Presented) A cathode structure according to Claim 1 wherein the columnar electric insulating material body has a trapezoidal cross-sectional shape.

16. (Previously Presented) A cathode structure according to Claim 1 wherein the columnar electric insulating material body has a cylinder shape with a lower extending annular wall surrounding the exit of the heating wire from the second end surface.

17. (Previously Presented) A cathode structure according to Claim 5 wherein the electron-emitting material contains barium oxide.

18. (Previously Presented) A cathode structure according to Claim 5 wherein the electric insulating material body is made of ceramic.

19. (Previously Presented) A cathode structure according to Claim 5 wherein further comprising a supporting metal wire attached to the cathode structure between the metal cup and the heater.

20. (Currently Amended) A cathode structure for an electron gun comprising:

a metal cylindrical open cup with a columnar pellet mounted in the metal cup, the columnar pellet contained within an inner diameter of the metal cup and extending above the metal cup to emit electrons;

a columnar electric insulating material body including a heating wire, in contact with insulating material of the insulating material body, having electrode leads extending from one end of the insulating material body, wherein the heating wire is coiled, within the insulating material body, around a first axis parallel to the electron emitting surface of the columnar pellet; and

a plurality of support wires attached to the cathode structure between a bottom of the metal cup and a surface of another end of the columnar electric insulating material body, to extend laterally outward from the bottom of the metal cup, wherein heat from the heating wire is transmitted to the metal cup to enable the columnar pellet to emit electrons, the columnar electric

insulating material body having a lower extending annular wall surrounding the electrode leads to suppress the electron emitting material from attaching to the electrode leads.

21. (Previously Presented) A cathode structure according to Claim 20 wherein barium oxide is the electron emitting material in the columnar pellet, and a surface of the columnar pellet above the metal cup is covered with an osmium-ruthenium thin film.

22. (Currently Amended) A cathode structure comprising:

a heater including a columnar electric insulating material body and a heating wire that is partially buried and in contact with the electric insulating material body; and

a cathode unit disposed at a first end surface of the electric insulating material body including a metal cup and a pellet member supported in the metal cup, the pellet member containing an electron-emitting material, wherein

the heating wire leads out from a second end surface of the electric insulating material body, wherein the electric insulating body is in a circular columnar shape with a longitudinal axis, and includes a part that has a greater diameter than that of the second end surface and the heating wire is coiled, within the insulating material body, around a first axis positioned traverse to the longitudinal axis to enable a compact configuration for the cathode structure.

23. (Previously Presented) A cathode structure comprising:

a heater including a columnar electric insulating material body and a heating wire that is partially buried and in contact with the electric insulating material body; and

a cathode unit disposed at a first end surface of the electric insulating material body including a metal cup and a pellet member supported in the metal cup, the pellet member containing an electron-emitting material, wherein

the heating wire leads out from a second end surface of the electric insulating material body, the electric insulating material body includes a wall disposed on the second end surface so as to surround a position from which the heating wire leads out, wherein the wall is disposed around a perimeter of the second end surface,

the second end surface surrounded by the wall rises in a dome shape, and

the heating wire leads out from a position between the wall and a center of the second end surface.

24. (Previously Presented) A cathode structure comprising:

a heater including a columnar electric insulating material body and a heating wire that is embedded in the electric insulating material body; and

a cathode unit disposed at a first end surface of the electric insulating material body including a metal cup and a pellet member supported in the metal cup, the pellet member containing an electron-emitting material, wherein

the heating wire leads out from a second end surface of the electric insulating material body, and the heating wire is coiled into an S shape when viewed perpendicular to an axis through the cathode structure.

REMARKS

The Office Action indicated that claims 23 and 24 and that the subject matter of claims 3 and 14 would be allowed if rewritten in independent form. It is respectfully requested that the indication of allowable subject matter in claims 3 and 14 be held in abeyance until the following amendments and comments are considered by the Examiner.

The present invention is in a relatively crowded field and the assignee of the present invention carries the brand name Panasonic and has considerable experience with television and display sets that utilize a cathode ray tube that would include an electron gun of the type defined in the present invention.

As can be readily appreciated, the structure of such devices have sought to become lighter and more compact and it is highly desirable that the cathode structure, for example, in a cathode ray tube, be made as short as possible in the direction of the tube axis while further becoming as efficient as possible in the amount of energy required to heat the electron emitting material. Balanced against these desirable features is a problem that is seeking to be addressed in our present claims. That is, as you make cathode structures more compact, problems can occur with the evaporated barium leaching to the rear and short circuiting the leading parts of the heating wire and the metal cup that holds the electron emitting pellet material. Thus, the present invention is attempting to efficiently heat electrical insulating material forming the body of a heater with a heater wire that is buried within the electrical insulating material in a highly compact and efficient manner. Additionally, the electric leads for the heating wire are positioned in such a manner to lessen the possibility of electrical shortages.

Within this environment, the merits of the present invention should be evaluated.

> "Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the decision-maker must consider the obviousness of the new structure in this light."
>
> *Continental Can Co. USA Inc. v. Monsanto Co.*, 20 U.S.P.Q.2d 1746, 1752 (Fed. Cir. 1991).

The Office Action contended that the Longo et al. US Patent No. 6,771,014 completely anticipated claims 1, 2, 4-10, 16, 17, and 22 under 35 U.S.C. § 102.

> "An anticipating reference must describe the patented subject matter with sufficient clarity and detail to establish that the subject matter existed in the prior art and that such existence would be recognized by persons of ordinary skill in the field of the invention. *See In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990); *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 678, 7 USPQ2d 1315, 1317 (Fed. Cir. 1988)."

The Longo et al reference is directed to a dispenser cathode, more particularly of the type utilized in a traveling wave tube. Basically, the Longo et al. invention was directed to enabling a high temperature processing during the support structure construction of the cathode to thereby prevent chemical reactions that could occur to reduce the efficiency and life of the cathode. *See* Column 1, lines 45-56. Thus, the Longo et al. design purportedly eliminated residue on the emitter that purportedly would occur in a high heat process of impregnating the pellet. *See* Column 2, lines 31-34. The solution to this problem was the provision of three separate conductive cups with the foremost cup supporting the impregnated pellet 12 of a special configuration having an indented annual groove 28 to thereby permit the cup 14 to be crimped for holding the pellet 12. As noted on Column 4, lines 30-46, the first cup 14 is connected with the second cup 30 and the third cup 48. Potting material 66 is used to hold the conventional cathode heater 56 in place within the third cup. This cathode support structure of the multiple

cups is then brought to a high level of purity through a high temperature heating thereby reducing any impurities and oxidation. Because of the capability of crimping the first cup and the particular configuration of the impregnated pellet 12, it is possible to subsequently install the pellet 12 after the high heat purity step.

As can be seen from Figure 1, a substantially insulated external casing 70 of a tubular form surrounds the sides of the respective first, second and third conductive cups, which purportedly insulates the cathode components. *See* Column 4, lines 1-3. As can be readily appreciated, the Longo et al. cathode design is not concerned about a compact configuration nor is it concerned with the efficiency in providing a novel design for the conventional heater coil. It certainly is not concerned with any problem of barium ions forming and shorting out the conductive rod 68 extending from the cathode heater. This rod 68 is more than adequately shrouded by multiple tubular members including the external casing 70.

Thus, the Longo et al. reference neither recognizes nor teaches the present invention. Presumably it was cited for a broad interpretation of the current claim language.

In this regard, claim 1 has been amended to define the compact configuration of our heating wire in a coil around a first axis that would be parallel to the first end surface of the electric insulating material. The Longo reference uses a convention coil extending around a longitudinal axis.

The dependent claim specifically defined the electrical insulating material body as including a wall disposed on the second end surface to surround a position from which the heating wire leads out. Longo et al. discloses electrical insulating material body which is identified in the specification as potting material 66 but is incorrectly designated in Figure 2. This potting material, however, appears to be an elongated cylinder and does not teach nor

suggest any "wall disposed on the second end surface." As can be readily appreciated from our specification and drawings, our wall is designed to increase the fly distance of any barium ions to thereby minimize the possibility of shorting out our electrical leads coming from a second end surface. The Longo et al. reference cannot be an anticipatory reference for claim 2. The Office Action asserted that the metal wall 48 would serve this function. However, the metal wall is simply a cylinder cup and is not "disposed on the second end surface" of the electric insulating material body. Thus, the features set forth in claims 2, 4, 5, 8, 9, 16, and 22 are not taught nor suggested by Longo. Certainly Longo provides no teaching or suggestion nor reason to provide a wall as defined in our claims since this is neither a problem nor a feature of the Longo et al. '014 patent.

Claim 15 was held to be obvious over the Longo et al. US Patent No. 6,771,014. The Office Action asserted that a trapezoidal cross sectional shape, would be within the scope of the teachings relied upon, e.g., the Longo et al. '014 patent.

It is believed the above comments more than adequately addresses the teachings of the Longo et al. reference to the present claims. Additionally, MPEP § 706.02(a) requires the applicant to be given the opportunity to evaluate any asserted teaching on the basis of an actual reference.

This is important since what a reference teaches is based upon the reference as a whole including the desirability and the obviousness to claim any such design feature. *See* MPEP § 2141(A),(B).

The Yamamoto et al. US Patent No. 6,300,711 was combined with the Longo et al. US Patent No. 5,065,070 to reject claims 1, 2 4-9, 11-13, 16, and 18-20 under 35 U.S.C. § 103.

The Longo et al. reference again was a dispenser cathode only with a single cylinder or retainer 20 supporting alumina insulator material with a standard heater 16. As noted on Column 3, lines 2-5, both the heater, the insulator and the container were simply standard configurations in the art. The actual invention taught by the Longo et al. '070 patent was directed to forming a "low work function scan-date surface," for example, a scandium oxide layer of 30 nm schematically shown as layer 14 in Figure 1. A person of skill in the field would accordingly seek to gather the advantages of the scandium oxide layer above the barium emitter matrix.

The Yamamoto et al. reference is apparently cited in hindsight from our present teaching simply to disclose electrode leads extending from the side between the electrode emitting filled cup 15 and the tubular sleeve 11. It is believed the Examiner is referring to the four wire prongs which may well be mounting prongs since the coil type heater 10 presumably has other electric leads at the bottom of the tubular sleeve 11.

Even, if hypothetically, the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

> [T]he level of skill in the art is a prism or lens through which a judge or jury views the prior art and the claimed invention. This reference point prevents these deciders from using their own insight or, worse yet, hindsight, to gauge obviousness. Rarely, however, will the skill in the art component operate to supply missing knowledge or prior art to reach an obviousness judgment. Skill in the art does not act as a bridge over gaps in substantive presentation of an obviousness case, but instead supplies the primary guarantee of objectivity in the process. *Al Site Corp. v. VSI International, Inc.*, 50 U.S.P.Q.2d 1161 (Fed. Cir. 1999) (citations omitted).

The Federal Circuit has addressed this issue in the case of *In re Rouffet*, 47 U.S.P.Q.2d 1453, 149 F.3d 1350 (Fed. Cir. 1998). In *Rouffet*, the Court noted that virtually all inventions are combinations of old elements. It concluded that:

> an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be 'an illogical and inappropriate process by which to determine patentability.' *Id.* at 1357.

The Court pointed to the absence of any teaching in the cited references for making the proposed modifications, and found that the Board had reversibly erred in determining that the invention was rendered obvious because there was no identification of motivation to choose the selected feature.

In summary, it would appear that the metal support wires between the cathode and the insulating body will be very susceptible to coating of barium ions but since the support wires are not electrical leads, the issue of shorting out does not appear to be a problem recognized nor addressed by Yamamoto et al. It certainly was not recognized nor addressed by the Longo et al. teaching of scandium oxide surface layers.

Claims 10 and 17 were rejected as being obvious over the Yamamoto et al. reference in view of the Longo et al. '070 patent when taken further in view of the Rand US Patent No. 5,105,456. The Rand reference does not address the deficiencies of Yamamoto et al. and the Longo et al. '070 patent, but simply is cited to specify the use of barium oxide in the pellet.

Claims 10, 17 and 21 are further rejected under 35 U.S.C. § 103 as being obvious in view of the Yamamoto et al. reference, the Longo et al. '070 when taken further in view of the Lee US

Patent No. 5,451,831. The Lee reference is simply directed to the electron emitting pellet and again does not teach nor recognize the high desirability of providing a compact cathode structure with heating efficiency while avoiding electrical shortage problems that occur with minimal structure and weight to the cathode configuration.

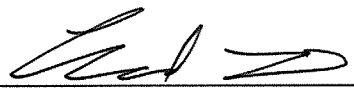
It is believed that each of our claims including the amended independent claims 1, 5, 20, and 22 more than adequately distinguish over any combination of the cited references. The dependent claims address specific features set forth in our embodiments that have not been addressed nor recognized in the references of record.

It is believed that the present case is now in condition for allowance and since this is an RCE application, the undersigned attorney would appreciate the courtesy of a telephone conference at the convenience of the Examiner before acting on this amendment.

If there are any questions, the undersigned attorney can be contacted at the listed telephone number.

Very truly yours,

SNELL & WILMER L.L.P.



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